

REMARKS

Claims 1-24 are pending in the subject application. Claim 10 stands objected to and claims 15-18 stand rejected for a typographic errors. The Examiner has also rejected all claims as obvious over a combination of Barclay, U.S. Patent No. 5,130,242; Kyle et al., U.S. Patent No. 5,397,591, Kilbride et al., U.S. Patent No. 5,000,888; and Cole et al., U.S. Patent No. 5,104,668. The typographic errors are corrected by this amendment. Arguments supporting Applicants traversal of the art rejection are presented below, and new claims are added directed to subject matter disclosed, but not previously claimed.

The Interview

Applicants wish to thank Examiner Weber for the courtesy of a personal Interview. At the Interview, Applicants presented arguments distinguishing the polar lipid material used in the present invention for animal feed from the whole microbial cells or the refined triglyceride of the prior art. Applicants also pointed out that spray drying is not routinely performed on lipid material, and none of the cited references disclose any procedures for spray drying a lipid material, whether polar or neutral. The present claim amendments were also discussed.

The Amendments

Claim 10 is amended to correct an obvious typographic error. Claims 15-18 are amended to indicate that they depend from independent claim 14. These dependent claims are drawn to an emulsion or suspension. Independent claim 14 is likewise drawn to an emulsion or suspension, while independent claim 1 is drawn to a particulate material. It is clear that claims 15-18 are intended to depend from claim 14, but for the typographic error corrected herein.

New claims 25-31 are drawn to methods of using the compositions of this invention in aquaculture. The broad concept (for independent claims 25 and 26) is disclosed, *inter alia*, on page 4, lines 3-5, page 5, lines 21-28, and page 8, lines 4-6. Specific properties of the aquaculture feed material are disclosed, *inter alia*, on page 2, lines 12-13 and 29-30 (particle size, claim 27), Table 3A (DHA:EPA ratio, claim 28), page 3, lines 20-24 and page 7, lines 1-3 (additional components, claims 29-30), and from page 5, line 10, to page 6, line 10 (production method, claim 31). These new claims being fully supported in the specification as filed, no new

matter is added by amendment, and Applicants respectfully request that the amendments be entered in the subject application.

The Invention

The present invention is based on recognition by the inventors that a waste product from the process for purification of microbial oil, which is disclosed in Kyle et al., U.S. Patent No. 5,407,957, is a surprisingly useful component for inclusion in animal feed. In the process of refining triglyceride oils from microbes, a waste stream is produced containing phospholipids and fatty acid soaps. When the microbial source is rich in polyunsaturated fatty acids, the polar lipid waste stream will also be rich in those fatty acids. This invention provides a novel use as nutrient material in animal feeds for what was a waste stream in the prior art.

Statement under Rule 607(c)

Applicants believe that new claims 25 and 27-31 correspond substantially to claims of U.S. Patent No. 6,261,590. Specifically, claim 25 corresponds substantially to at least claims 2, 4, 11, and 27 of the '590 patent; claim 27 corresponds substantially to at least 14-16 and 27 of the '590 patent; claim 28 corresponds substantially to claims at least 1, 17-20, and 24 of the '590 patent; claim 29 corresponds substantially to claim at least 10 of the '590 patent; claim 30 corresponds substantially to at least claim 23 of the '590 patent; and claim 31 corresponds substantially to at least claim 28 of the '590 patent. Other claims of the '590 patent may correspond inherently or substantially to one or more claims of the subject application.

Formal Objections And Rejections

Claim 10 stands objected to for a typographic error, and claims 15-18 stand rejected under 35 U.S.C. §112, second paragraph, as indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is respectfully submitted that the objection and rejection are overcome by amendment of the respective claims.

Claim 10 is amended herein to correct the typographical error. Dependency of claims 15-18 is corrected to ensure correspondence with the independent claim from which they depend. As amended, these claims particularly point out and distinctly claim the subject matter which Applicants regard as their invention. Therefore, Applicants respectfully request that the

objection to claim 10 and the rejection of claims 15-18 under 35 U.S.C. §112, second paragraph, be withdrawn.

Rejection over Art

Claims 1-24 stand rejected under 35 U.S.C. § 103(a) as unpatentable over a combination of Barclay U.S. Patent No. 5,130,242, Kyle et al., U.S. Patent No. 5,397,591, Kilbride et al., U.S. Patent No. 5,000,888, and Cole, et al., U.S. Patent No. 5,104,668. This rejection is respectfully traversed.

Barclay and Kyle disclose production of DHA-containing microbes and extraction of lipids from the microbes. Kyle, et al., further describes refining of the lipids to obtain a triglyceride oil (i.e., neutral lipid) and use of the oil in nutritional products. Neither Barclay nor Kyle et al describe any uses for polar lipid extracts.

Kilbride, et al., describes spray-drying slurries of riboflavin plus binder, but nothing in Kilbride relates to lipid material, whether polar or neutral. Cole, et al., describes spray-drying slurries of artemia to produce particles of suitable size for feeding aquaculture larva, but likewise, Cole, et al., is silent concerning lipid material. Applicants respectfully point out that nothing in the Kilbride or Cole references teaches spray drying of any lipid material. Nothing in either reference suggests selection of the polar lipid extract for spray-drying or the use of polar lipid extracts in any form for nutritional purposes.

Barclay and Kyle only suggest using whole microbes or the triglyceride fraction for animal feeding. Proximate analysis of whole cell material such as that described in Barclay is set out in the attached Web Page print out for Algamac-2000, and proximate analysis for DHASCO®, a refined DHA oil according to Kyle, et al., is also attached. The following table compares these compositions to the composition of polar lipid extract set out in Table 1 of the present application.

Material	Dried whole cells (as described by Barclay)	Refined triglyceride (as described in Kyle, et al.)	Polar lipid extract (according to the present invention)
Protein	39%	<1%	10-13%
Carbohydrate	13%	<1%	7-8%
Fat	32%	>95%	55-62%
Ash	12%	<1%	10%
Moisture	3%	<0.1%	4-6%

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Even combining Barclay and Kyle with Kilbride and Cole would at best produce spray-dried whole cells or triglyceride material, which may be readily distinguished from the phospholipid-based material of the present invention based on composition. Failure of the teachings of the cited references to produce the claimed material demonstrates that the present invention is not obvious in view of the cited references. Therefore, Applicants respectfully request that the rejection of claims 1-24 under 35 U.S.C. § 103(a) be withdrawn.

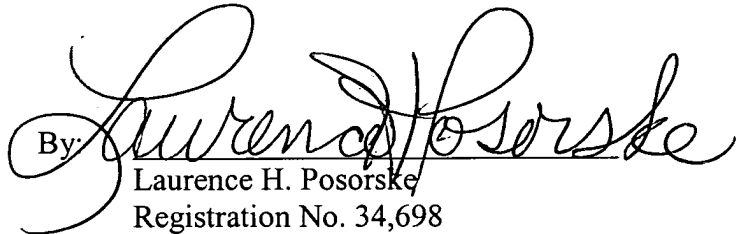
CONCLUSION

Applicants respectfully submit that this application is in condition for allowance, and such disposition is earnestly solicited. If the Examiner believes that the prosecution might be advanced by discussing the application with Applicants' representatives, in person or over the telephone, we would welcome the opportunity to do so.

Respectfully submitted,

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Enclosures

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APPENDIX A
MARKED-UP VERSION OF CLAIMS
U.S. Patent Application No. 09/529,021
(as amended September 12, 2001)

1. A particulate material containing phospholipids with docosahexaenoic acid (DHA) residues prepared by drying a slurry comprising a polar lipid extract from DHA-containing microbes.
2. The particulate material of claim 1, wherein the mean particle size is between 5 microns and 10 microns.
3. The particulate material of claim 1, wherein the slurry is dried by spray drying.
4. The particulate material of claim 1, wherein the slurry is substantially free of material which did not originate in said DHA-containing microbes.
5. The particulate material of claim 1, wherein at least 10% of the fatty acid residues in lipids of said microbes are DHA residues.
6. The particulate material of claim 1, wherein at least 10% of the fatty acid residues in polar lipids of said microbes are DHA residues.
7. The particulate material of claim 1, wherein said microbes are dinoflagellates.
8. The particulate material of claim 1, wherein said microbes are *Cryptocodinium cohnii*.
9. A method for preparing a DHA-containing particulate material comprising drying a slurry containing polar lipids extracted from dinoflagellates, wherein the dried material is in the form of particles having a mean particle diameter between 5 and 10 microns.

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10. A method for preparing a DHA-containing particulate material comprising lysing DHA-containing microbial cells; extracting lysed cells with solvent; separating a polar lipid fraction from the extract; and drying the polar lipid fraction, with or without addition of other nutrients, to form [aparticulate]a particulate material.

11. The method of claim 10, wherein the polar lipid fraction is an aqueous slurry which is dried by spray drying.

12. The method of claim 10, wherein the microbial cells are dinoflagellate cells.

13. The method of claim 10, wherein the microbial cells are cells of *Cryptocodinium cohnii*.

14. An aqueous emulsion or suspension containing phospholipids with docosahexaenoic acid (DHA) residues prepared by Honogenizing with water a polar lipid extract from DHA-containing microbes.

15. The emulsion or suspension of claim [1,]14, wherein at least 10% of the fatty acid residues in lipids of the microbes are DHA residues.

16. The emulsion or suspension of claim [1,]14, wherein at least 10% of the fatty acid residues in polar lipids of said microbes are DHA residues.

17. The emulsion or suspension of claim [1,]14, wherein said microbes are dinoflagellates.

18. The emulsion or suspension of claim [1,]14, wherein said microbes are *Cryptocodinium cohnii*.

19. A composition comprising a particulate material containing phospholipids with DHA prepared by drying a slurry comprising a polar lipid extract from DHA-containing microbes and a meal containing protein, carbohydrate, or both.

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20. The composition of claim 19, wherein meal comprises microbial cells or cell fragments.

21. The composition of claim 19, wherein the microbial cells or cell fragments are from *Chlorella*.

22. The composition of claim 19, wherein the microbial cells or cell fragments are from *Cryptocodinium*.

23. The composition of claim 19, wherein the microbial cells or cell fragments are from a yeast.

24. The composition of claim 19, wherein the microbial cells or cell fragments are from *Mortierella*.

25. A method of aquaculture comprising
feeding particulate material containing a polar lipid extract from
microbes comprising phospholipid with DHA residues to live larval feed organisms
comprising artemia, rotifers, or a combination thereof to enrich DHA level in the larval
organisms; and
feeding DHA-enriched live larval organisms to fish larva, bivalves,
crustaceans, or a combination thereof.

26. A method of aquaculture comprising
feeding particulate material containing a polar lipid extract from
microbes comprising phospholipid with DHA residues to bivalves and/or crustaceans.

27. The method of claim 25 or 26, wherein particulate material
containing phospholipid with DHA residues has mean particle size from about 5 microns
to about 10 microns.

28. The method of claim 25 or 26, wherein particulate material containing phospholipid with DHA residues comprises DHA and EPA in ratio of at least 300:1.

29. The method of claim 25 or 26, wherein particulate material containing phospholipid with DHA residues further comprises vitamins, amino acids, or both.

30. The method of claim 25 or 26, wherein particulate material containing phospholipid with DHA residues further comprises Chlorella biomass.

31. The method of claim 25 or 26, wherein particulate material containing phospholipid with DHA residues is prepared by spray-drying a phospholipid-containing byproduct produced in refining a lipid extract from microalgae.